THE

AMERICAN REVIEW OF TUBERCULOSIS

ABSTRACTS OF TUBERCULOSIS

VOLUME X SEPTEMBER, 1924 ABST. NO. 1

Review of Surgical Treatment of Pulmonary Tuberculosis.—In France the surgical treatment of pulmonary tuberculosis has not generally met with much favor, although the Lyons school including Bérard and Dumarest, Madinier and Guilleminet, have contributed to its literature. The chief principles of the surgical procedures used may be said to be drainage and removal of tuberculous foci, mobilization and increased ventilation of the lung, and immobilization or collapse. Drainage of tuberculous cavities is deplored, 17 of Tuffier's 45 patients having succumbed within three months after such operation. Pneumonectomy, with a few brilliant exceptions, has also failed to produce good results. Freund's operation of resection of the first costal cartilage is only of historic interest. Immobilization or collapse-therapy was an attempt to apply the same general principles employed in the case of other tuberculous lesions, aided by observations made on cases in which the lung collapsed as a result of pleural effusion or spontaneous pneumothorax, and on the retraction and falling in of the thoracic wall in old cavity cases, with imbrication of the ribs and deviation of the spinal column. The methods used are (1) artificial pneumothorax, (2) extrapleural thoracoplasty, (3) extrapleural pneumothorax, pleuroparietal discission or pleurolysis, and (4) phrenicotomy. *1: Artificial Pneumothorax:* Not only is immobilization necessary if we are to prevent the further evolution of severe tuberculous lesions, but the lung must be actually collapsed and maintained in this state for a considerable time. Such conditions are most favorable for cicatrization, but they also imply a pleura free from adhesions, which is unfortunately not the rule. *2: Thoracoplasty:* Thoracoplasty was conceived with the purpose of immobilizing the lung after the manner of a pneumothorax, but in reality it does not bring about such a pulmonary collapse, but merely puts the lung in a position favorable to its further retraction. The first surgeons to practise it, such as De Cerenville in 1885, did very limited operations. Then came Brauer and Friedrich with extensive resection of the bony chest wall. The results of such mutilating intervention were really very bad,—severe operative shock, hernias of the lung, cardiac embarrassment, and congestion and edema of the opposite lung. The physicopathological conditions were similar to those obtaining with an open pneumothorax, the whole hemithorax contents being displaced and encroaching on the sound lung. Friedrich's mortality was little short of 50 per cent. Wilms's columnar resection may be passed over as an intermediate step introduced in 1911 but now abandoned. In 1912 Sauerbruch first practised posterior or paravertebral resection of all the ribs, or of a limited number, according to the extent of the disease and condition of the patient. The results were encouraging and led to the adoption of similar or modified procedures by Saugman, Bull, Jacobaeus and Key in the Scandinavian countries; Roux in Switzerland; Bérard, Sauty, Leriche and Patal in France; and Shortle, Gekler and Archibald in America. Local, regional or general anesthesia may be employed. Some men proceed from above downward and others from below upward. A complementary anterior resection near the sternum is sometimes added. Sudden death from cardiac or pulmonary accident is rarer than with Friedrich's operation; nevertheless, in extensive resections, the first few hours or days after the operation are dramatic and full of danger. Later, in the majority of cases, these alarming symp-

toms progressively subside and improvement begins. The sputum may at first increase and usually does not begin to decrease for about ten days. The chief complications are infection of the operative field and infection of the sound lung. Congestive or even pneumonic attacks, which may clear up, in the sound lung are not rare. A tuberculous extension, especially of the bronchogenic type, is more serious. Regarding results, the best thoracoplasty does not give better than a 75 per cent collapse, but tension is relieved and a spontaneous cure rendered more likely, progressive sclerosis and contraction being hastened. The entire hemithorax contracts and the scapula drops. The auscultatory changes commonly noted are enfeebled breath-sounds at the base, and harshness or even tubular or cavernous breathing in the middle or superior third. Large moist resonating râles may be heard, often transmitted to the opposite side. One may sum up the end results from various sources as one-third cured, one-third improved and one-third dead. *Indications:* Thoracoplasty should only be considered when pneumothorax has been impossible to accomplish; however, its indications even so are more restricted than those of pneumothorax, as it entails more operative and subsequent risks. A most important prerequisite is that the lung shall have shown some tendency toward healing; thus, the acute forms are at once ruled out. The forms particularly suitable for thoracoplasty are the severe extensive and destructive frankly unilateral ones, the large fibrocavernous lesions of chronic phthisis, with loss of substance but tendency to fibrosis, not highly active and associated with a good constitutional resistance, pneumothorax being impossible (Bérard and Dumarest). Spontaneous tendency to contraction of the chest wall is a good sign. *Contraindications:* Acute tuberculosis, renal or intestinal tuberculosis, poor or enfeebled general condition, marked anemia or cachexia, extreme age, myocarditis, diabetes, chronic nephritis, amyloid disease. The results of thoracoplasty have generally not been good in city hospital patients, and the hygienic advantages of the sanatorium ought to be combined with it. Thoracoplasty is frequently indicated in the treatment of bronchopleural fistula resulting from perforation of the lung, especially in the course of artificial pneumothorax, and in tuberculous empyema, by keeping the lung collapsed, bringing the pleural layers in approximation, and compressing the fistulous opening. It was in a case of tuberculous empyema with pachypleuritis that Carl Spengler performed his first thoracoplasty in 1890. The extent of the thoracoplasty will depend upon the extent of the lung disease and the condition of the patient. It may be combined with an incomplete pneumothorax, and is preferable to the endoscopic severance of adhesions. Phrenicotomy may be used as an adjuvant. *3: Extrapleural Pulmonary Compression by Pleuroparietal Discission or Pneumolysis:* Tuffier, in 1910, first applied this measure, which consists in dissecting the parietal pleura from the chest-wall and interposing either fatty tissue, Beck's paste, (paraffine and bismuth) or an inflated balloon. It is especially advised for apical cavities. The operative risks are not great, but the results are not as satisfactory as those of thoracoplasty, as a rule. *Phrenicotomy:* Employed alone, this measure avails little but is best combined with thoracoplasty, or immediately preceding it, as advised by Alexander and Sauerbruch. In some cases a bilateral phrenicotomy may be done with advantage. *Conclusions:* Saugman has estimated that from 4 to 8 per cent of sanatorium patients are amenable to surgical treatment. It is emphasized that only the following types of disease justify such intervention: Chronic unilateral forms in satisfactory general condition, showing some tendency toward spontaneous healing, which, however, is insufficient without further aid to effect a complete cure.—*Traitement chirurgical de la tuberculose pulmonaire, A. Courcoux and B. Desplas, Rev. d. l. Tuberc., December, 1923, iv, 630.*—(*A. P.*)

Surgical Treatment of Pulmonary Tuberculosis.—Sanatorium treatment is the most widely recognized method of combating pulmonary tuberculosis. It has, however, great limitations. Because of these limitations attempts to discover some substitute or accessory have been made. Artificial pneumothorax was at first ignored, then treated with opprobrium, then tolerated, and finally more and more widely recognized and employed. The relative disadvantages of a partial collapse due to limiting adhesions led to devising means for the division of these adhesions, and its impracticability when the pleural membranes were adherent led to the introduction of the major surgical procedures for collapsing the lung by apicolysis and thoracoplasty. Here, again, success is finally claiming recognition. As the simplest and safest methods must always be preferred, a pneumothorax is always attempted first, especially since the existence and extent of

adhesions cannot be foretold. The division of localized bands of adhesions can be done by a special tenotome passed into the pleura through an intercostal space and guided by X-ray illumination, or by an electric cautery, passed through a cannula, vision being obtained through a thoracoscope inserted through an adjacent intercostal space. In the case of multiple broad adhesions it is wisest to open the chest and divide them between ligatures. Effusion may follow and must be kept from contact with the wound by aspiration. Thoracoplasty necessitates absolute quiescence of the disease in the opposite lung. The posterior paravertebral resection is safest. The area of operation is anesthetized with 2 per cent novocaine and each intercostal nerve injected with 5 minims of absolute alcohol. Sufficient chloroform is given to maintain unconsciousness. Apicolysis is particularly suitable for those cases in which the disease is confined to the upper lobe, which is the seat of a dense fibrocavernous lesion. Section of the phrenic nerve in the neck is followed by paralysis of one dome of the diaphragm in about 80 per cent of cases, allowing partial collapse of the base and abolishing the incessant dry diaphragmatic cough.—*Some Aspects of the Surgical Treatment of Pulmonary Tuberculosis, H. M. Davies, Brit. J. Tuberc., April, 1924, xviii, 51.*—(*A. P.*)

Indications for Surgical Treatment of Pulmonary Tuberculosis.—A real interest in the surgical treatment of pulmonary tuberculosis in England has at last been aroused, largely by the visits of eminent foreign surgeons. It is tempting to speculate on the changes that will have to come about in sanatoria built for treatment by graduated exercise. It will mean the addition of operating facilities as well as X-rays, an increase in nursing accomodation and nursing and medical staff, generally inadequate in most of our institutions, even for pneumothorax treatment. The aim and object of all varieties of surgical intervention is to obtain lung collapse in order to (1) rest the lung, (2) obliterate cavities and approximate their walls, (3) compress the lung and check bleeding, and (4) abolish dyspnea due to tension within the lung. It is not generally recognized that dyspnea depends far less on the extent of loss of functioning lung substance than on the interference with relative freedom of expansion of lung and chest wall. So much simpler and less severe is pneumothorax than thoracoplasty or even apicolysis, that it must be the method of choice when practicable. Adhesions, however, greatly limit its success. From a surgical standpoint pulmonary tuberculosis is classified as follows: *1. Acute Tuberculosis:* (1) miliary, (2) pneumonic. *2. Chronic Tuberculosis:* (1) early stage; (2) fibrotic stage, in which pathological mechanical factors begin to appear, also secondary infection; (3) stage of bronchiectasis and cavitation, in which these factors are pronounced, often completely dominating the picture, and there is added failure of nutrition and a high swinging temperature. *Indications for Surgical Intervention:* The acute pneumonic form, if unilateral, is offered its greatest hope by pneumothorax. However, it will take a long time to collapse a consolidated lung and for absorption of pathological products to occur. If pneumothorax fails thoracoplasty should not be attempted, as the patient's condition is too grave for such a serious operation. Phrenicotomy, however, can safely be performed. When we come to chronic pulmonary tuberculosis, there are various considerations. There are certain cases of the early stage in which pneumothorax is considered justifiable if indications of recovery fail to appear or the disease readily reasserts itself. One must not be too much deceived by a patient's good appearance. Davies has never regretted doing an early pneumothorax, but has often regretted not doing one. However, temperament of the patient and his facilities for continuing treatment must also be considered. In stages 2 and 3 surgical intervention is indicated when practicable; especially in stage 3 the outlook is very dreary with any other line of treatment. In these stages, when pneumothorax is impracticable, apicolysis and thoracoplasty must be considered as alternatives, the former operation being confined to cases of disease limited to the upper lobe and sharply delimited. The contraindications to pneumothorax and thoracoplasty are much the same, but more stringent and rigid for the major operation. Laryngeal tuberculosis *per se* is not a contraindication unless very advanced and associated with severe symptoms. A failing heart or neurotic temperament are definite contraindications, as is also serious involvement of the opposite lung. In the case of pneumothorax, activity in the other lung is not a bar, but it must not be acute, and fibrosis if present must be localized, not diffuse. Cavitation or bronchiectasis in the other lung are contraindications. When bilateral pneumothorax is performed, consecutive rather than simultaneous collapse is advised, with several months interval. The danger in these cases is heart failure. In the case

of thoracoplasty clinical evidence alone should not be relied on; absence of all evidences of activity in the functioning lung is essential. The results of surgical treatment deserve mention. When a complete pneumothorax is obtainable, without adhesions, over 70 per cent of patients have become fit for work, and of those on whom a thoracoplasty has been done 50 to 60 per cent are "relatively cured," free from symptoms, or much improved. The operative mortality (Gravesen, Jacobaeus, Hey and Davies) is little over 8 per cent.—*The Indications for Operative Treatment in Cases of Pulmonary Tuberculosis, H. M. Davies, Lancet, May 24, ccvi, 1051.*—*(A. P.)*

Indications for Thoracoplasty.—Thoracoplasty should always be considered in pulmonary tuberculosis when, after a proper trial of sanatorium treatment, pneumothorax has been tried but found impossible. There are, however, two additional factors, which render the decision more onerous and difficult: first, that it is a much more formidable procedure than pneumothorax, and second, that once performed it cannot be abandoned and its effects nullified. Attention must be directed to the general condition, particularly as to the nutrition and circulation, past evidence of powers of resistance, and the extent and activity of the disease in the sounder lung. The most obviously suitable patient for thoracoplasty is the one with good general condition and one good lung, who shows indications of resistance to tuberculosis, such as good nutrition, shrinkage of the affected side, or a healed laryngitis. The question will be most pressing in the case of patients with persistent slight fever, troublesome cough and excessive expectoration, who have ceased to improve under sanatorium treatment. These are almost certain to be worn down by their disease and eventually succumb in one way or another. If fairly well nourished, they are eligible for thoracoplasty. Emaciated patients, however, or those suffering from marked toxemia are likely to have life shortened by operation. The following questions should be considered: (1) Is the disease in the better lung comparatively slight relative to that in the worse lung? (2) Is the prognosis without operation obviously very bad? (3) Is the patient's strength so far gone that he is likely to succumb to the shock of the operation? (4) Is the better lung functionally good enough to carry on a quiet life after operation? (5) Is there any evidence of recent activity on the better side? To decide these questions, a careful review of all the symptoms is more necessary than too profound a study of the physical signs and roentgenograms. The degree of dyspnea especially should be shrewdly observed. As for the operation itself, it should not take more than forty minutes, yet this requires a smart surgeon and good equipment. Thoracoplasty has now largely superseded pneumolysis. It is also indicated in certain extrapulmonary conditions, as persistent tuberculous empyema or pyopneumothorax. In some cases free drainage must first be established.—*When Should Thoracoplasty Be Advised, S. V. Pearson, Tubercle, May, 1924, v, 376.*—*(A. P.)*

Phrenicotomy.—Reference is made to improved methods of phrenicotomy, such as the radical operation of Götze and *phrenicoexairese* of Felix, as an addition to or substitute for artificial pneumothorax. The newer observations on diaphragmatic innervation are reviewed. Four cases are described in which the Götze radical phrenicotomy combined with *phrenicoexairese* was performed but its value cannot be accurately judged. The Götze operation is considered less hazardous than the exairesis.—*Zur Phrenicotomiefrage, H. Schulte-Tigges, Ztschr. f. Tuberk., July, 1923, xxxviii, 254.*—*(H. J. C.)*

Radical Phrenicotomy in Pulmonary Tuberculosis.—Phrenicotomy as practised at the Surgical University Clinic in Frankfort a. M. has proved itself very valuable. It is absolutely essential not to depend only upon blocking the phrenic alone but the subclavian nerve (where it originates from the brachial plexus) should be cut also. Only thus can an actual paralysis of the diaphragm be attained. The results are especially gratifying.—*Die radikale Phrenikotomie als selbständiger therapeutischer Eingriff bei der chirurgischen Lungentuberkulose, O. Goetze, Arch. f. klin. Chir., 1922, cxxi, 224.*—*(H. J. C.)*

Indications for Radical Phrenicotomy and Results.—In some of the cases in which artificial pneumothorax or thoracoplasty were considered, phrenicotomy alone was effective while in others it served to reinforce conservative operative measures. Especially the infiltrating, rapidly progressive and destructive cases of pulmonary tuberculosis, which frequently give poor results with thoracoplasty, are benefited by phrenicotomy. Indications for phrenicotomy are: (1) unsatisfactory collapse from pneumothorax; (2) when a thoraco-

plasty is forbidden or in preparation therefor; (3) when disease of the healthy side is suspected the diseased side is tested by freezing for 15 seconds, and if there is no reaction phrenicotomy is performed. Of 20 operated cases, observed for 4 months to 2 years, 17 were successful; in one case the process progressed on the opposite side; 9 were apparently improved and 7 can be considered almost healed. The blood picture is of value in determining the course, lymphopenia indicating a serious prognosis and lymphocytosis a favorable action of the phrenicotomy.—*Indikationen und Erfolge der radikalen Phrenicotomie, H. Fischer, Centralbl. f. Chir., May, 1923, l, 781.*—(*H. J. C.*)

Bronchoscopic Treatment of Suppurating Pulmonary Disease.—This study covers 38 cases of suppuration of the lungs treated by bronchoscopic methods, with observations and inferences on certain phases of this subject. Localization was determined by X-ray and bronchoscopic examination. The bases of the lungs are most commonly affected; the right more often than the left. There is evidence to show that these areas undergo some degree of resolution. This is certainly true of peribronchial thickening, which usually accompanies these suppurations. *Conclusions:* 1. These records, though limited in number, show localization at the bases in the majority of cases; proximal suppuration occurs more often than peripheral. 2. Bronchoscopy is the logical means by which to facilitate better drainage and to aid medical treatment. Free drainage is always fundamental for suppuration anywhere. 3. Early diagnosis and treatment are advantageous. 4. Patients with lung suppuration cannot all be cured by bronchoscopic drainage and treatment. A certain percentage certainly can be. A large percentage can be improved. The remainder with few exceptions are made happier through the alleviation of symptoms which have made them thoroughly wretched both day and night. 5. The improvement in subjective symptoms is apparently more rapid than the roentgen-ray findings would indicate. This is due to the shadows cast by fibrous tissue formed in the affected area in the healing process. 6. No mortality has been encountered so far at the Bronchoscopic Clinic; this shows how safe a procedure bronchoscopy is when performed by men properly trained in the work. 7. Patients are willing to continue the treatment as long as deemed advisable because of the lessening of the cough and foul expectoration, and general improvement. Moore has yet to see a patient who declined further treatment because of any dread of a repetition of bronchoscopic treatment.—*The Bronchoscopic Treatment of Suppurative Diseases of the Lungs, W. F. Moore, J. Am. M. Ass., March 29, 1924, lxxxii, 1036.*—(*B. T. McM.*)

Key to Abstractors

A. P.: Andrew Peters, Loomis, New York
B. T. McM.: B. T. McMahon, Loomis, New York
H. J. C.: H. J. Corper, Denver, Colorado